

AFFIDAVIT OF RENUGA GOPAL

Relating to U.S. Patent Application 10/743,562 Filed December 22, 2003

I RENUGA GOPAL of Blk 154, Yishun Street 11, #09-88, Singapore 760154, Republic of Singapore, hereby MAKE OATH AND SAY AS FOLLOWS:

1. I am a named inventor for the patent application 10/743,562 filed December 22, 2003, entitled FIBER REINFORCED COMPOSITE AND METHOD OF FORMING THE SAME (hereinafter "The Application") and as such have knowledge of the facts contained herein.
2. I was a student at the National University of Singapore during the period from July 2000 to April, 2002, enrolled first in a Bachelor of Engineering program (prior to June 2001) and then in a Master's program (after May 2001). My supervisors for the Master's program were Dr. Seeram Ramakrisna and Dr. Loh Poey Ling. The advisers for my Master's program were Dr. Vijay Kumar Ganesh and Dr. Kazutoshi Fujihara. My research work in the Master's program was conducted in collaboration with Dr. Foong Weng Chiong Kelvin, and Dr. Chew Chong Lin, all of whom are named inventors in the Application.
3. As part of my B. Eng program, I conducted research from July 2000 to May 2001. My research project during this period was to make composite orthodontic wires using rigid dies. By May 2001, I realized that to make better composite wires with a small diameter, it would be desirable to reduce the stress exerted on the fibers during the formation process. My solution was to use a flexible shrinkable die.
4. As part of my Master's program, I, together with my advisors researched a suitable flexible shrinkable dies and a suitable procedure for forming composite wires with improved properties. We obtained some flexible shrinkable tubing under the brand name SUMITUBE, and used these tubing to form fiber reinforced composite wires in a process as described and claimed in the Application, prior to October 19, 2001. Our work during this period was memorized in a routine progress report (in the form of PowerPoint slides) prepared by myself (hereinafter "the Report"), a copy of which is attached as Exhibit A to this Affidavit. The Report was shared with my co-inventor and supervisor, Professor Seeram, on October 19, 2001, as part of a routine review of our research progress.

5. The Report shows the processing setup used and the steps we took for forming the composite wires (see slides 4, 9, and 11). In particular, on slides 4, 9 and 11, it is shown that the process we performed included the steps of inserting glass fibers and resin into a heat-shrinkable tube, which was hung from a support bar; applying heat to shrink the tube; and curing the specimen. During the formation process, I observed that the tunnel in the shrinkable tubing retained its cross-sectional shape and shrunk uniformly in cross-sectional area when the tubing was heat-shrunk. The cross-sectional shape of the tunnel in the tubing was round both before and after shrinkage. This is evidenced from the cross-sectional images of the composite wires produced from this process, shown on slides 5 to 7 and 10 of the Report, where the round peripheral edges of the wires reflect the round shape of the shrunk tubing tunnel. The setup and steps shown in the Report reflect embodiments disclosed and claimed in the Application (see e.g. FIGS. 1 to 4 of the Application and accompanying description). The Report is thus evidence that the invention of the Application was actually reduced to practice prior to April 18, 2002.
 6. The images on slides 5 to 7 and 10 also show that the fibers were substantially evenly distributed in the composite wires produced by the process. The graphs of measured results on slides 12, 13 and 16 of the Report show that the product composite wires exhibited improved mechanical properties. The graph on slide 16 of the Report shows a similar result as that shown in FIG. 6 of the Application. These images and graphs show that the process we performed worked for the intended purposes prior to April 18, 2002.
 7. I hereby declare that all statements made herein are of my own knowledge, are true, and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that wilful false statements and the like so made are punishable by fine and imprisonment, or both, under section 1001 of Title 18 of the United States Code and that such wilful false statements may jeopardize the validity of the application or any patent issued thereon.

SWORN BEFORE ME at *The UPS Store*
Poosley, Georgia, United States of America.)
On this 26 day of September 2007)

RENUGA GOPAL

~~Notary Public~~

Norris Lee Wright Jr.

Notary Public

My Commission Expires: September 1, 2008